

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN DISC BRAKES

(71) We, GIRLING LIMITED, a British Company, of Kings Road, Tyseley, Birmingham 11, Warwickshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

The present invention relates to sliding caliper disc brakes.

The invention is particularly concerned with brakes of the type comprising a carrier member for fixing to a vehicle, a caliper member slidably mounted on the carrier member, and an actuator for urging a friction assembly onto one side of a rotatable disc to cause the caliper member to slide relative to the carrier member to apply by reaction a second friction assembly onto the other side of the disc.

It has been proposed to mount the caliper member on the carrier member by means of a pair of pins which are slidable in respective openings in one of the members and are secured to the other of the members. It has been found that, especially in heavy duty brakes for use on commercial vehicles, additional guidance and location of the caliper member may be advantageous.

According to the present invention, there is provided a sliding caliper disc brake comprising a carrier member for fixing to a vehicle, a caliper member slidably mounted on the carrier member, and an actuator for urging a friction assembly onto one side of a rotatable disc to cause the caliper member to slide relative to the carrier member to apply by reaction a second friction assembly onto the other side of the disc, the caliper member comprising a crown portion which lies radially outwardly of the disc and interconnects front and rear limbs lying on either side respectively of the disc,

the crown portion having dimensions which, when the caliper is in its operative position, prevent the friction assemblies from being withdrawn from their operative positions in a radially outward direction, and the caliper member being mounted on the carrier member by a pair of pins which are longitudinally slidable in directions parallel to the axis of rotation of the disc in respective openings in one of the members and releasably secured to the other of the members and at least one further sliding connection spaced from said pins.

The three sliding connections are preferably provided by three pin assemblies all of which may be secured to one of members and slidable in the other member or one or more of which may be secured to the other member and slidable in said one of the members. In the preferred embodiment, two of the pin assemblies are secured to the caliper member and the third pin assembly is secured to the carrier member. Each of the pin assemblies is preferably of two-part construction, one part being slidable in an opening in the caliper member or carrier member and the other part being releasably connected to said one part to secure the carrier member or caliper member respectively to said one part. The caliper member can therefore be removed from the carrier member without disturbing the sliding connection between said one part of the member in which it is slidable.

One or more, preferably two, of the pin assemblies may be resiliently mounted to cushion vibration and loading and to take up misalignment between the caliper and carrier members. In a preferred construction, one of the pin assemblies has one of its parts arranged as a close sliding fit in its opening and has the other of its parts passing as a close fit through an opening in the member to which the pin as-

sembly is secured. The close fit of the two parts provides firm lateral location of the caliper member on the carrier member and thereby reduces or prevents rattle effects.

5 The invention is further described, by way of example, with reference to the drawings accompanying the Provisional Specification in which:—

Fig. 1 is a plan view partly in section of
10 a disc brake constructed in accordance with the present invention;

Fig. 2 is a front elevation partly in section of the disc brake shown in Fig. 1;

Fig. 3 is a side elevation of a carrier
15 member of the disc brake viewed in the direction of the arrow A in Fig. 2; and

Fig. 4 is a side elevation from the other side of the front portion of the disc brake, shown partly in section.

20 The disc brake shown in the drawings comprises a caliper member 10 slidably mounted on a carrier member 12 by a pair of pin assemblies 14 and 16 and a third pin assembly 18. As is clearly shown in
25 Fig. 3, the carrier member 12 has a bridging portion 20 which extends across a rotatable disc 22 (Fig. 4) and interconnects downwardly extending front and rear limbs 24 and 26. The caliper member 10 is
30 similarly shaped in having a crown portion 28 which interconnects a bifurcated front limb 30 and a rear limb 32 which carries a hydraulic actuator.

The hydraulic actuator comprises a pair
35 of hydraulic cylinders 34 in which are slidable respective pistons 36 engaging the backplate of a directly actuated friction pad 38. The front limb 30 of the caliper member engages the backplate of an indirectly
40 actuated friction pad 40 arranged on the other side of the disc 22. As is clear from Figs. 1 and 2, both of the pads 38 and 40 are carried by the carrier member 12 which is formed for this purpose
45 with pairs of sliding surfaces 42 and 44, which slidably engage the sides of the pad backplates, and with shoulders, two of which are designated 46 in Fig. 2, on
50 which outwardly extending lugs 48 of the pad backplates seat. The lugs 48 are urged against the carrier member by leaf springs 50 arranged between the pads and the crown portion 28 of the caliper. Drag forces experienced by the pads when the
55 pads are urged against the rotating disc are thus transmitted directly to the carrier member so that the pin assemblies 14, 16 and 18 are relieved of drag loading.

60 Actuation of the brake by introduction of hydraulic fluid under pressure into the cylinders 34 causes the directly actuated pad 38 to be urged against one side of the disc 22 whereupon reaction forces cause the caliper member to slide rearwardly
65 with respect to the carrier member to

apply the indirectly actuated pad 40 to the other side of the disc.

The pin assembly 14 comprises a bush 52 slidable in a blind opening in the carrier member 12 and a bolt 54 which is in
70 screw-threaded engagement with the bush 52 and thereby connects the bush 52 to an outwardly extending caliper lug 56 through which the bolt 54 extends. The opening in the lug 56 is oversized and accommodates
75 a resilient bush 58 which is compressed between the end of the bush 52 and a washer 60 engaging the head of the bolt 54. The extent to which the resilient bush 58 is compressed is determined by the length of
80 an increased diameter bolt portion 62 which terminates in a shoulder abutting against the end of the bush 52. The bush 52 which is slidable in its opening in the carrier member is retained in its opening
85 by a sealing boot 64 which prevents the ingress of dirt and moisture onto the sliding surfaces.

The pin assembly 16 is similar to the pin assembly 14 except that the resilient
90 bush is omitted and the bolt 66 passes through the caliper lug 68 without the clearance necessary to accommodate a resilient bush. The bolt 66 is not shouldered as is the bush 52 so that the bush 52,
95 which is also provided with a sealing boot 64, abuts directly against the caliper lug 68.

The pin assembly 18 which provides a third sliding connection between the caliper
100 member and carrier member comprises a bush 70 in a blind opening in the crown portion 28 of the caliper member and a bolt 72 which passes with clearance through an opening in an upstanding portion
105 74 of the carrier member and is in screw-threaded engagement with the bush 70. An enlarged diameter portion of the opening through which the bolt 72 passes accommodates a resilient O-ring 76 which
110 resiliently locates the bolt 72 with respect to the carrier member. As in the case of the pin assembly 14, the bolt 72 is shouldered to limit compression of the O-ring 76. The bush 70 passes through a wiper
115 seal 78 let into the wall of the opening in which the bush 70 is slidable.

The third pin assembly 18, which is spaced both radially and axially (of the disc) from the pin assemblies 14 and 16,
120 provides extra location and guidance of the caliper member on the carrier member. The resilient mounting of the bolts 54 and 72 (and the bolt 66 if desired) accommodates such misalignment as may exist
125 between the nominally aligned openings in the caliper lugs and carrier member and also accommodates such misalignment as may arise through flexing of the carrier member during heavy braking.
130

WHAT WE CLAIM IS:—

1. A sliding caliper disc brake comprising a carrier member for fixing to a vehicle, a caliper member slidably mounted on the carrier member, and an actuator for urging a friction assembly onto one side of a rotatable disc to cause the caliper member to slide relative to the carrier member to apply by reaction a second friction assembly onto the other side of the disc, the caliper member comprising a crown portion which lies radially outwardly of the disc and interconnects front and rear limbs lying on either side respectively of the disc, the crown portion having dimensions which, when the caliper is in its operative position, prevent the friction assemblies from being withdrawn from their operative positions in a radially outward direction, and the caliper member being mounted on the carrier member by a pair of pins which are longitudinally slidable in directions parallel to the axis of rotation of the disc in respective openings in one of the members and releasably secured to the other of the members and at least one further sliding connection spaced from said pins.
2. A disc brake as claimed in claim 1 in which said further sliding connection comprises a third pin assembly.
3. A disc brake as claimed in claim 2 in which the third pin assembly is slidable in the other of the members.
4. A disc brake as claimed in claim 3 in which each of the pin assemblies has a first part slidable in its respective opening and a second part releasably connected to said first part to releasably secure the pin

assembly to the respective member.

5. A disc brake as claimed in claim 4 including sealing means which enclose the sliding surfaces of the pin assemblies and their openings.

6. A disc brake as claimed in claim 5 in which said sealing means of at least said pair of pin assemblies are adapted to retain said first part of each of said pair in its respective opening even when the caliper member is removed from the carrier member.

7. A disk brake as claimed in any of claims 4 to 6 in which both parts of one of said pair of pin assemblies are a close fit in respective openings to provide firm lateral location of the caliper member on the carrier member.

8. A disc brake as claimed in claim 7 in which the other two pin assemblies are resiliently secured to their respective members.

9. A disc brake as claimed in claim 8 in which said second part of each of said other two pin assemblies passes through a laterally oversized opening in the member to which said other two pin assemblies are secured and is laterally positioned therein by resilient means.

10. A sliding caliper disc brake constructed substantially as hereinbefore described with reference to and as illustrated in the drawings accompanying the Provisional Specification.

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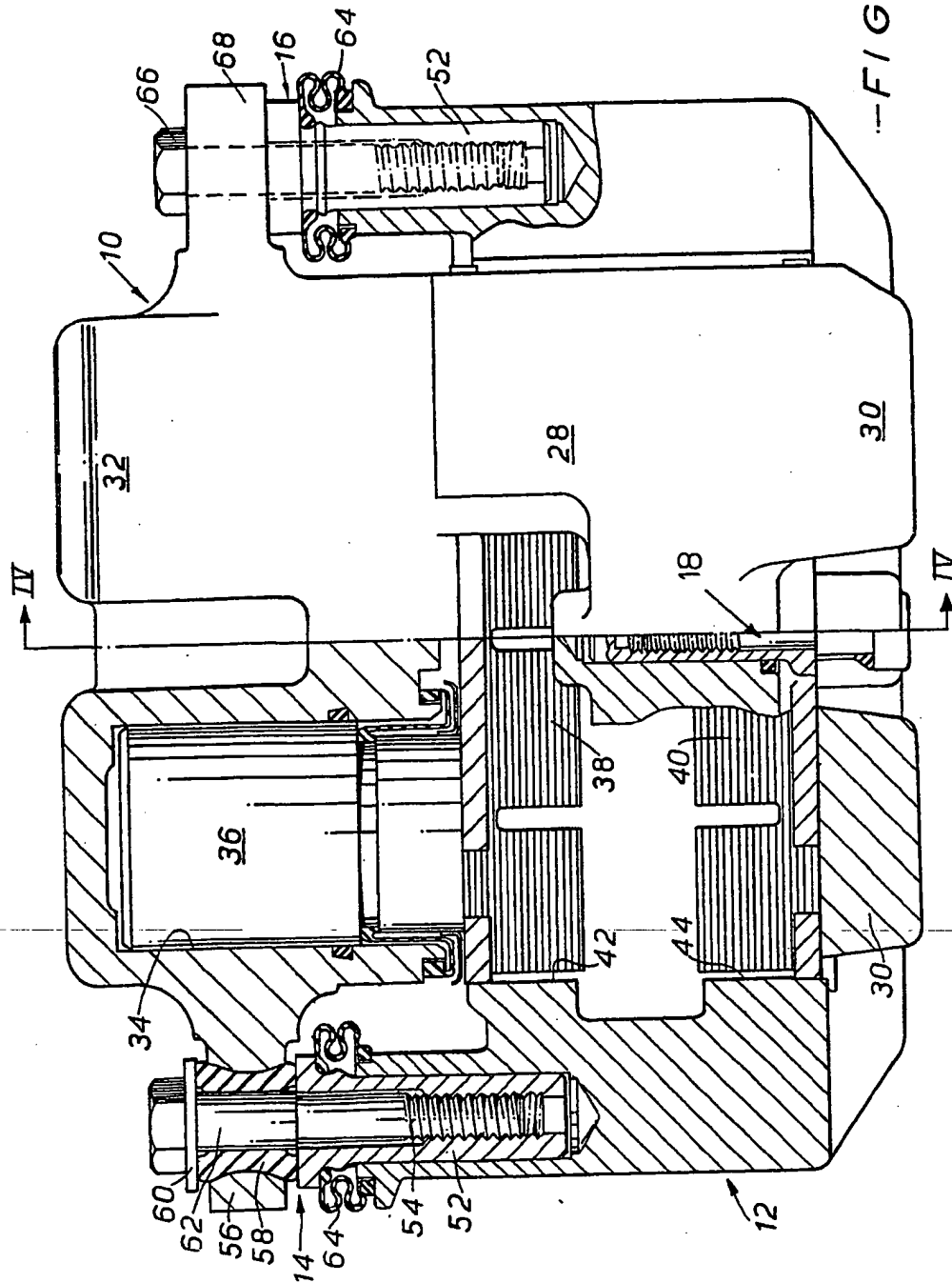
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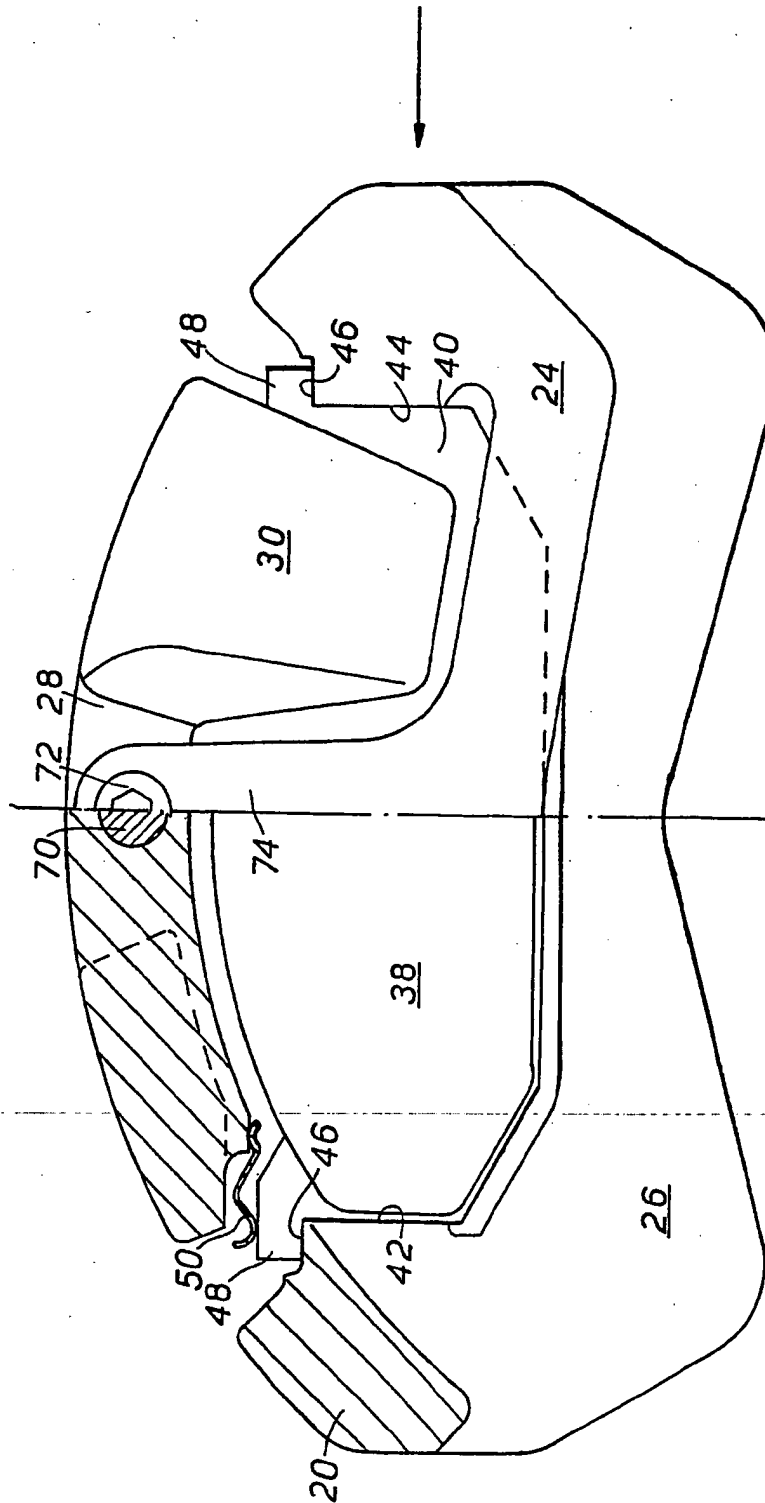
PROVISIONAL SPECIFICATION

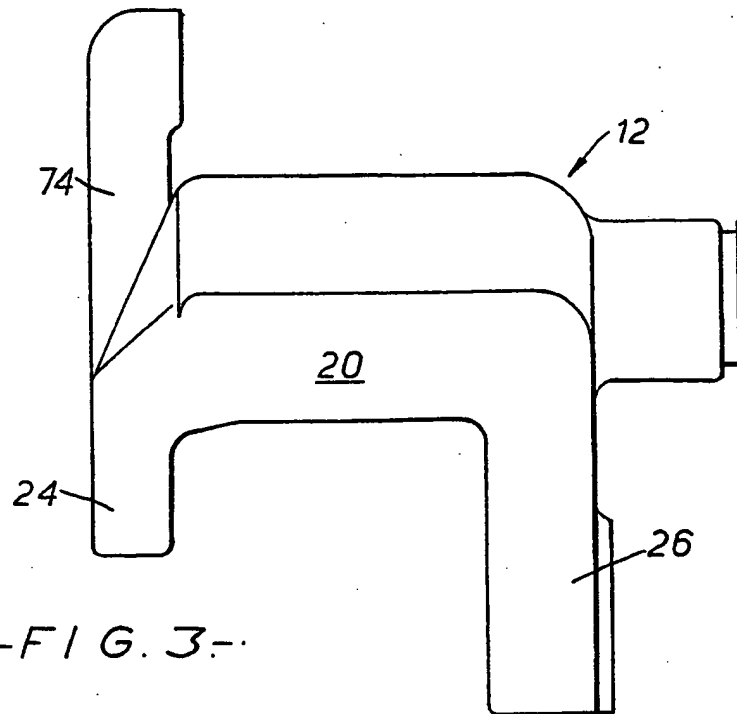
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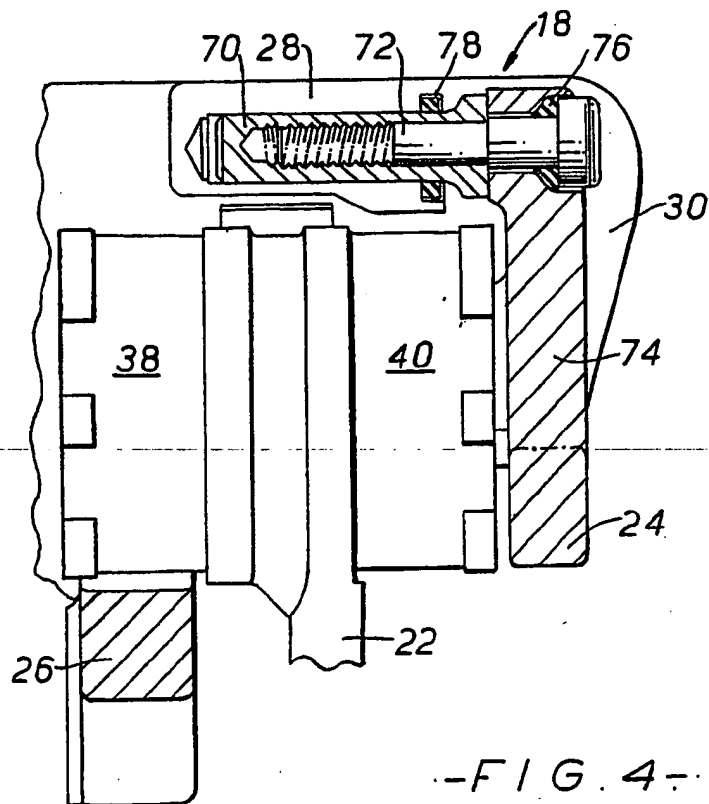
SHEET 1







-FIG. 3-



-FIG. 4-

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